WHAT IS CLAIMED IS:

1. A method of manufacturing carbon fiber coils by heating a stock gas, which is subjected to thermal decomposition to generate solid carbon, and a catalytic gas, which promotes thermal decomposition of the stock gas, in a reaction chamber, the method comprising the steps of:

placing a solid catalyst at a predetermined position within the reaction chamber;

supplying the reaction chamber with the stock gas and the catalytic gas; and

heating the interior of the reaction chamber to grow carbon fiber coils from the stock gas, wherein an electromagnetic field generated in the heating step is substantially not formed in the reaction chamber.

2. The method according to claim 1, wherein the catalytic gas contains elements of the fifteenth and sixteenth groups in the periodic table.

3. The method according to claim 2, wherein the stock gas and the catalytic gas are supplied to the reaction chamber through an inflow port formed in the reaction chamber at a predetermined flow velocity, respectively.

4. The method according to claim 3, wherein the amount of the stock gas supplied per unit time when represented in terms of linear velocity (cm/min) is in the range of 10 to 10000 times a distance (cm) between an outlet of the inflow port and the solid catalyst.

5. The method according to claim 4, further comprising

applying electric voltage to the catalyst from an external power source to charge the solid catalyst.

6. The method according to claim 5, wherein the external power source is a DC power source and the electric voltage is negative and the solid catalyst is negatively charged.

7. The method according to claim 4, wherein the reaction chamber is heated to a temperature in the range of 700 °C to 830 °C.

8. An apparatus for manufacturing carbon fiber coils from a stock gas, which is subjected to thermal decomposition to generate a solid carbon, and a catalytic gas, which promotes thermal decomposition of the stock gas, the apparatus comprising:

a reaction chamber supplied with the stock gas and the catalytic gas, the reaction chamber being supplied with the stock gas and the catalytic gas through the inflow port;

a solid catalyst placed at a predetermined position within the reaction chamber; and

a heating device for heating the interior of the reaction chamber to grow carbon fiber coils from the stock gas, the heating device being such that there is substantially no electromagnetic field in the reaction chamber when the reaction chamber is heated.

9. The apparatus according to claim 8, wherein the solid catalyst is located to face an outlet of the inflow port such that a distance (cm) between the solid catalyst and the outlet of the inflow port is in the range of 1/10000 to 1/10 of the inflow velocity (cm/min) of the stock gas flowing

through the inflow port.

10. The apparatus according to claim 9, wherein the stock gas contains any one of acetylene, methane and propane.

11. The apparatus according to claim 9, wherein the catalytic gas contains a catalytic gas having elements of the fifteenth and sixteenth groups in the periodic table.

12. The apparatus according to claim 11, wherein the catalytic gas contains any one of sulfur, thiophene, hydrogen sulfide, methylmercaptan, phosphorus and phosphorus trichloride.

13. The apparatus according to claim 10, wherein the catalyst contains fine crystals of nickel.

14. The apparatus according to claim 8, wherein the reaction chamber is heated to a temperature in the range of 700 °C to 830 °C.

15. The apparatus according to claim 14, wherein the heating device comprises a burner or burners.

16. The apparatus according to claim 14, wherein the heating device comprises a heating chamber covering the periphery of the reaction chamber, and a high temperature fluid, which is caused to flow between the heating chamber and the reaction chamber.

17. The apparatus according to claim 8, further comprising an external power source, which applies electric voltage to

the solid catalyst to charge the solid catalyst with electricity.

18. The apparatus according to claim 17, wherein the external power source is a DC power source and the electric voltage is negative and the solid catalyst is negatively charged.

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